Meteorological Support to the Air Force Eastern Test Range

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Summary

The Air Force Eastern Test Range Staff Meteorologist who is also the Commander of Detachment 11, 6th Weather Wing, is responsible for providing meteorological support to the Air Force Eastern Test Range (AFETR). Pan American World Airways through its Aerospace Services Division is contracted by the Air Force to operate the meteorological data acquisition systems and perform the data processing for meteorological support on the range. Generally, the Air Force provides the forecasting and meteorological consultant services to range users and range operating elements and Pan American operates the meteorological instrumentation, meteorological rocket systems and performs the data processing to satisfy the needs of range users for environmental data.

Meteorological support for missile and space system operations on the AFETR is provided by the Staff Meteorologist who is also Commander of Det. 11, 6WW of the Air Weather Service. Pan American World Airways, through its Aerospace Services Division, is contracted by the Air Force to operate the meteorological data acquisition system and perform the data processing for meteorological support on the range.

The Air Weather Service unit and the Pan American meteorological support activities are organized as shown in Figure 1. The Air Force unit is headed by the Staff Meteorologist and is composed of three major operating sections. The first of these is the Assistant for Meteorology to the Manager of the Department of Defense Manned Space Support Operations (DDMS) who is responsible for providing meteorological consultant services and coordinating DOD meteorological support provided to manned space flight operations.

The second unit is the Assistant Staff Meteorologist's office which furnishes the direct weather forecasting and meteorological consultant and planning services to the ETR users and operating echelons.

The third operating section is the Stations Operation's unit which mans the Cape Kennedy Forecast Facility and the Patrick AFB station, including the airport observation station. This unit also operates a maintenance shop to maintain the meteorological instrumentation which is used by the Air Force at PAFB and some special instrumentation at Cape Kennedy.

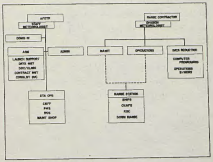

Figure 1

Organization of Air Force and Pan American Meteorological Support Units on the Air Force Eastern Test Range

The Assistant for Meteorology to the Manager, DDMS, coordinates the World Wide support provided to the NASA Manned Space Flight Operations, including numerous Air Weather Service reconnaissance flights, special forecasting services from the Global Weather Center at Offutt AFB,

and the collection of meteorological data from the Naval recovery vessels at sea. He serves as the DOD representative for meteorological support on the team which works as an integral part of the Mission Control activity at the Manned Spacecraft Center at Houston, Texas, during manned missions.

The Air Force meteorologists who man the Cape Kennedy Forecast Facility provide continuous forecasting services to all missile and space system test operations conducted on the ETR. The briefing section of the Cape Kennedy Forecast Facility, including the closed circuit TV system, is shown in Figure 2. In addition to providing continuous forecasting for test operations, forecasts are provided routinely for all range stations to support aircraft operations and to keep Operations Management people advised of weather conditions which might affect their stations.

Meteorological consultant services are provided to prospective range users to assist in the planning for future test operations. Complete climatological data files for the range are also maintained for ready reference. In addition, these meteorologists provide operational forecasting support to the APOLLO Range Instrumented Aircraft (ARIA) on a world wide basis during all test operations in which these aircraft are involved.

Figure 2
Cape Kennedy Forecast Facility

The Station Operations unit at PAFB mans a flight operations briefing section during sixteen hours of the day for conventional weather support to PAFB operations. During the remaining hours of each day and on weekends, flight forecasts are provided by closed circuit TV from the Cape Kennedy Forecast Facility. The television monitor is located adjacent to the Base Operations' dispatcher at PAFB. This unit also provides aerial weather observers who fly with range support aircraft to make special weather observations over the off-shore areas adjacent to Cape Kennedy prior to and during launch operations. These observations are radioed directly to the Cape Kennedy Forecast Facility for immediate use of the Staff Meteorologist.

Referring again to Figure 1, Pan Am's meteorological support activity is organized on a systems concept with the Division Meteorologist as the overall System Manager. On the Division Meteorologist's staff are specialists in meteorological equipment maintenance, observational procedures and meteorological data reduction.

Pan Am operates six full time land weather stations and three shipboard stations on the range. The weather station shown in Figure 3 is a typical range meteorological facility. In addition to the conventional rawinsonde upper air observation equipment and surface observing systems, three of the land stations are equipped to make meteorological rocket observations on a routine basis. Two of the three shipboard stations are also equipped to launch meteorological rockets. Figure 4 shows the loading of an ARCAS meteorological rocket to be launched from the Cape Kennedy facility. This is one of the standard rockets used for routine and special test support observations to altitudes of approximately 200,000 feet. The three land stations which have rocket facilities are located at Cape Kennedy, Antigua and Ascension Island. The rocket facility at Cape Kennedy includes equipment to launch larger, two-stage meteorological rockets which have the capability of measuring data to altitudes of over 300,000 feet.

Figure 3

Cape Kennedy Weather Station

Rawinsonde observations are made from all stations on a routine basis using conventional balloon-borne radiosondes for the measurement of atmospheric data to approximately 100,000 feet. The ground equipment used for rawinsonde observations on the ETR is the new automatic AN/GMD-4 system. This equipment automatically digitizes the meteorological and spherical coordinate data received from the radiosondes and formats the raw data on punched paper tape for teletype transmission to a central data reduction unit.

In the ETR launch area which extends over Cape Kennedy and Merritt Island, a special purpose micrometeorological instrumentation network is operated and maintained by the Range Contractor. The system consists of 22 meteorological towers varying in height from 12 feet to 500 feet. The system is controlled automatically by a digital computer and specialized analog-to-digital conversion equipment. The output from the sensor network is formatted and integrated over specified time periods for the use of the Staff Meteorologist in making micrometeorological forecasts. The specific purpose for which the system was designed and installed was to provide the capability to make detailed predictions of the diffusion characteristics of the low level atmosphere.

All upper air meteorological data are transmitted by teletype to a central data reduction facility located at Cape Kennedy. Figure 5 shows a portion of the CDC-3100 computer used in this facility. The system is equipped with four tape drives, card reader, card punch, paper tape reader/punch, two disc drives and a CRT display unit. The programming and operation of this system is performed under the range contract by Pan American.

Figure 4

Loading ARCAS Meteorological Rocket at Cape Kennedy

Figure 5

Meteorological Data Reduction Facility at Cape Kennedy

Meteorological data processing for the Eastern Test Range account for approximately 350 hours of the more than 450 hours per month utilization now achieved on this computer system. Many of the techniques for special processing of rawinsonde and high altitude meteorological rocket data have been pioneered on the ETR during the past several years. These techniques have, in many cases, provided the basis for meteorological data reduction procedures at other locations such as the Air Force Flight Test Center at Edwards AFB and the Navy's Pacific Missile Range at Point Mugu, California.

The meteorological support system on the Eastern Test Range, which includes Rawinsonde and Rocketsonde observing networks, a central data processing unit, an automatic micrometeorological network and a closed circuit TV net for data dissemination is believed to be one of the more modern and complete systems of its kind in existence.